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REVIEWS OF RECENT LITERATURE.

GENERAL BIOLOGY.

Action of Salt Solutions upon Eggs. — Few now underrate the value of physiological experimentation as an aid in the advance of pure science as well as a basis for practical arts, even though the results obtained may be but abnormal states of the organisms studied; it is a hopeful sign of the times that these methods are being so actively extended to the study of the lowest organisms and even to the sphinx-like mystery of the egg. An important venture in this direction is that of Professor T. H. Morgan,¹ who now adds a second paper to his first account of notable discoveries published three years ago.

This paper contains the results of arduous labor, and is illustrated by careful drawings. Only a few of the many important facts and inferences can be touched upon here.

The author found that sea-urchin eggs, whether fertilized or not, when placed a short time in sea water to which two per cent or less of sodium or magnesium chloride has been added, and then returned to common sea water, show inside clear spots which change position and number. When these eggs are sectioned and stained, the clear spots are represented by darkly stained regions and radiating lines — in fact “stars” comparable to those seen in karyokinesis. Some stars have central specks comparable to centrosomes.

If the eggs are not fertilized, they may nevertheless, when so treated, undergo a process of cleavage into many cells. The cleavage, however, is not like the normal, nor does it lead to the formation of larvæ, so far as known. Sections of such eggs show that the chromosomes are distributed through the egg, apparently by the action of the stars, and that the cleavage of the egg takes place about these chromosomes as centers.

In some other animals, notably a Nemertean and a Gephyrean, similar star-formations were produced by treating the unfertilized eggs with the same salt solutions.

It is thus possible to bring out stars and centrosomes similar to the normal ones, but in abnormal numbers and positions, by mere

¹ *Archiv f. Entwicklungsmechanik*, 1899, Bd. viii, pp. 448–536, Pls. VI–X.

excess of some of the salts common in sea water. Moreover, eggs that have not been fertilized may cleave in such changed sea water, and in this cleavage there are divisions and distributions of chromosomes with accompanying activities of centrosomes and of asters.

There is, of course, room for doubt and for difference of opinion as to the light shed by these abnormal processes upon the normal ones in the basic phenomena of fertilization and of cleavage. The author cites facts that show the power of the egg to cleave without the centrosome and the aster, and thinks the chromosome part of the nucleus the most influential part of each cell. As cleavage may take place without reference to asters, mechanical hypotheses of contractile bands or pushing rods seem to him unnecessary.

Centrosomes, he thinks, may be formed *de novo* from protoplasm outside the nucleus or within it, and may sometimes persist and in other cases be of short life. His results are to some extent iconoclastic, and he would depose the centrosome from its assumed rôle of hereditary monarch.

The author sees in these results of adding salts no direct mechanical phenomena, but only the reactions of living eggs when stimulated by changed environment. The egg becomes more a living thing than it seemed when we were ignorant of these possibilities.

Holding this standpoint, the author would do well to abandon his term "artificial stars," since it does not appear that these reactions to salts are more *artificial* than those produced by adding sperm, nor, in fact, than the reaction of a frog's leg when salt is placed upon it.

E. A. A.

History of the Natural Sciences.—The first volume of Dannemann's *Grundriss einer Geschichte der Naturwissenschaften*, which contains so admirable a series of selections from the works of the most distinguished natural scientists of the past, has been supplemented by a second volume,¹ in which the historical development of the natural sciences is dealt with. The subject-matter of this volume is largely astronomical, physical, and chemical; and the arrangement essentially chronological. While it is to be admitted that chemistry and physics are in a sense more fundamental than the biological sciences, and, therefore, deserve a certain degree of precedence in an historical account, it is to be regretted that so important

¹ Dannemann, F. *Grundriss einer Geschichte der Naturwissenschaften*; 2. Bd., *Die Entwicklung der Naturwissenschaften*, 435 pp., 76 illustrations. Leipzig, W. Engelmann. 1898.